NASA TECH BRIEF

New Weldable High Strength Aluminum Alloy Developed for Cryogenic Service

The problem:

To develop a new 7000 series wrought aluminum alloy (Al–Zn–Mg) that would have mechanical properties superior to those of standard 7000 series alloys, which are relatively low in notch toughness and weldability.

The solution:

An alloy composed of 6.5 Zn, 1.8 Mg, 0.2 Mn, 0.12 Zr, and 0.10 Cu.

How it's done:

Tests indicate that the use of zirconium results in improved low temperature notch toughness and weldability. The manganese and chromium serve as supplementary strengthening elements with beneficial effects on grain size and resistance to stress corrosion cracking. This alloy can be mill-fabricated to plate and sheet without difficulty. Moderate amounts of cold forming are possible prior to artificial aging. Solution heat treatment temperature is 860°F and the alloy is fully heat treatable to a range of desired tempers. The mechanical properties (approximately at room temperature) of this alloy are:

Tensile strength	74,000 psi
Yield strength	65,000 psi
2-inch elongation	12%
Notch–Tensile Ratio	
Room Temperature	1.31
-320°F	1.05
-423°F	0.95

Notes:

1. This alloy was originally designated M826, and an Aluminum Association registration of this alloy as X7007 has been requested.
2. Post-weld aging has been found to improve weld ductility and strength properties. A typical treatment is 8 hours at 225°F plus 16 hours at 300°F.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B66-10613

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Aluminum Company of America
under contract to
Marshall Space Flight Center

(M-FS-737)

Category 05